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# THE MEDICAL JOURNAL OF AUSTRALIA.

VOL. I.—5TH YEAR. SYDNEY: SATURDAY, JUNE 8, 1918. No. 23.

## GUNSHOT WOUNDS OF THE KNEE-JOINT.

By **Balcombe Quick, F.R.C.S.,**

*Lieutenant-Colonel, Australian Army Medical Corps; Surgical Specialist, First Australian General Hospital, France.*

Of the varied types of war wounds which come under treatment in a base hospital in France, none are of more interest than those affecting the knee-joint, and few demand more incessant care throughout their course and judgement in their treatment. The variety of injury found is infinite, and in those which become infected the organisms will be found to show differences in kind and in virulence which in turn materially affect the prognosis and the treatment.

To the surgeon accustomed in civil work to approach every arthrotomy of the knee only after the most elaborate precautions, and even then perhaps with some small misgivings of the possibility of the accident of sepsis, it is a matter for no small wonder to find what a capacity for taking care of itself the knee-joint can exhibit.

Necessarily, all operations are carried out in theatres where 99% of the cases are septic wounds, and although as far as possible the knees will be listed first, this is by no means always practicable where many operations are being done daily. Moreover, there can never be the same time spent upon, nor care given to, the preparation of the skin as is considered essential in civil surgery. From the mere presence of a wound a perfect toilette is impossible, and, as a rule, no further preparation of the field than shaving and painting with iodine is done before the patient reaches the table, and at times all preparation has to be deferred until the anæsthetic is given. Then a more vigorous cleansing is given with ether, followed by spirit and tincture of iodine, the wound, unless small and dry, being packed with a little gauze also wetted with iodine.

In dealing with the different types of injury and their appropriate treatment, the subject is best approached by dividing the wounds into those caused by (*a*) rifle or machine-gun bullet in normal flight, (*b*) shrapnel bullet, (*c*) high explosive shell fragment, fragment of bomb, or deformed rifle bullet. These, in turn, vary greatly, according as there is or is not an accompanying bone injury, and to its type and extent.

The knee is, practically speaking, the only joint in the body where one may find a simple joint wound with no lesion of the bone ends forming it, and such cases comprised 48% of the total in a large series of cases in this area. The balance is complicated by a bone wound of greater or lesser degree, and it is this feature which often dominates the case. Where the damage to the bone is such that one must regard the injury rather as a fracture of the lower end of the femur or upper end of the tibia, complicated by a wound of the knee-joint, one is getting on to rather different ground, and the most difficult cases, and those calling for the most judgement, are these and the intermediate types. In such conditions, not only has the immediate risk to life to be considered, but the question of the future stability of the joint must be taken into account, and thus the wisdom of an immediate excision of the knee or of an amputation of the limb, rather than any attempt at, apparently, more conservative measures, may become evident.

### (a) Rifle or Machine-gun Bullet in Normal Flight.

This is a bullet which produces the typical punctured entrance wound, and, at ranges from, say, 300 yards upwards, an only very slightly larger exit.

This missile has absolutely no tendency to carry in with it any fibres of clothing, and is probably sufficiently hot to destroy the few organisms which it may gain in its passage through clothing or skin.

#### *(i.) Without Bone Injury.*

This is rare, though I have seen cases in which the bullet has traversed the joint from side to side just behind the patella, or again antero-posteriorly between the articular surfaces, without any fracture discoverable by X-ray plates. More rarely still a spent bullet may lodge in the joint without causing a fracture. But in such a case, or where the bullet has embedded itself in cancellous bone, inspection will usually show that the wound of entry is larger than the usual puncture. The nearly spent bullet is flying unevenly, or has "ricochetted" from some soft substance without undergoing gross deformation. Infection in these cases appears rather prone to occur, and I view them with suspicion (Case I.).

In this subdivision, too, may be taken the cases in which the bullet causes a simple punctured bone wound—the fracture *par séton* of the French—unaccompanied by any splitting. This is one of the most frequent types of bullet wounds of the knee, which, however, are not met with in any great number.

The outstanding feature of this class is the complete immunity from sepsis. A wound of this type—small entrance and exit wounds, with or without a punctured wound of the bone—gives one very little anxiety. The only treatment, as a rule, necessary, is painting of the wounds with iodine and a dry dressing and rest to the joint on a comfortable back splint. Occasionally a good deal of pain may be complained of when the effusion into the joint reaches a high degree of tension, and it may then be as well to empty the joint of the blood-stained synovia it contains by puncturing it. From the tissue reaction to the injury there may be some local warmth, and the general temperature may rise a degree or two from the hæmarthrosis; but this seldom lasts more than two or three days, falling gradually to normal. I have once or twice observed some little reddening around the margins of the punctures, doubtless from the ingrowth of skin cocci, but the synovial wound is so quickly repaired that it prevents any spread to the joint cavity, and a few warm moist dressings soon cause the slight areola to disappear.

I believe that the end results of these cases are good. I have seen a knee with the scar of a bullet entry in the centre of the patella and exit in the mid line of the popliteal space, and yet with absolutely unimpaired function. This man had been wounded eighteen months earlier.

Incidentally, it is extraordinary how often the popliteal vessels escape in such wounds as this last. Diffuse aneurysm or arterio-venous aneurysm may occur from injury to them; but, on the other hand, one sees cases in which, from the course of the bullet, it would appear impossible for them to have escaped, yet no vascular injury can be detected.

*Illustrative Case.*

*Case I.*—Pte. E.B.D., wounded on November 18, 1916; admitted on November 22, 1916. He showed a small, clean entrance wound, just below the patella, and a similar wound of exit in the mid-popliteal space. On admission, his temperature was 38.5° C., and his pulse-rate 108. No sign of any injury to the nerves or vessels was present. The joint was distended, but not painful. X-rays showed a doubtful injury to the femur in the inter-condyloid notch. Fluid (very blood-stained) was drawn off for bacteriological examination, which showed it to be sterile. During the next three days his temperature ranged between 37.8° and 38.8° C., reaching normal on November 27, 1916, and remaining so until his evacuation a week later.

This case also illustrates an unusually high and prolonged pyrexia from a clean hæmarthrosis (Chart I.).

*Case II.*—In contrast with this last case is that of Pte. W.P., who was wounded April 21, 1917, and admitted on April 28, 1917. He had lain out for nearly three days. On the casualty clearing station card was entered: "Perforating wound of the knee-joint. No pulsation in posterior tibial artery. Has had no sensation in foot since." The entrance wound, a punctured one, was just above the patella; the exit wound was about 0.5 cm. in diameter in the mid-popliteal space, which was considerably swollen and ecchymotic, with a diffuse pulsation. The foot was cold, but no tabsolutely so.

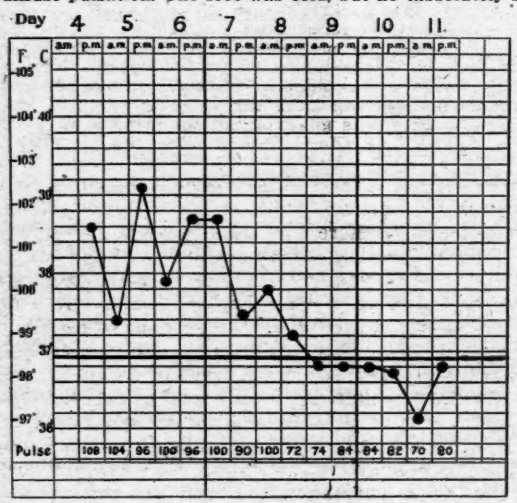



Chart I.

After applying a tourniquet, the exit wound was excised and the space widely opened by vertical incision. A considerable amount of clot was turned out, and the popliteal vessels examined. The vein was completely torn across, with ragged ends, and these were ligatured. The artery was torn in about half its circumference. A Tuffier's tube was tied into it, and, on removal of the tourniquet, strong pulsation was felt in the artery beyond. No pulsation returned in the tibials. The femur was cleanly fractured just above the condyles. On the 30th, the foot and leg having become quite cold and mottled, an amputation through the thigh was done. Owing to the presence of a mild infection, the long anterior flap was brought down over a gauze pack, and final suturing carried out some days later.

In some cases, especially where the range has been under 300 yards, one finds that the exit wound in the soft parts is considerably larger, even in the absence of any explosive effect upon the bone. When the exit wound is larger than a threepenny piece, it must be looked upon as liable to infection, and it should be excised down to the synovial membrane. If fluid escapes from the wound in this, it should be excised and then sutured, but I have not seen a case where the synovial wound was extensive, even in the presence of considerable loss of more superficial tissues. After cutting away the damaged margins of skin, muscle, etc., the resulting wound is treated on its merits by suture, packing, or Carrel-Dakin irrigation.

In the following case, which gave some anxiety, excision was deferred on account of the bismuth-iodoform-paraffin paste treatment given at the casualty clearing station:—

*Case III.*—Pte. J.W.W. was wounded in the right knee on April 23, 1917. The bullet entry (slightly reddened) was over the right patella. A ragged exit of about 7.5 cm. by 5 cm. to the inner side and a little posteriorly. He had had bismuth-iodoform-paraffin paste put in the wound. There had been some bleeding around into the subcutaneous tissues and torn muscle. The temperature and pulse-rate were only slightly raised on admission on April 24, 1917. The left joint was full. There was a rather dirty surface wound of the left thigh from the same bullet. April 25, 1917: Temperature, 37.5° C.; pulse-rate, 120. April 26, 1917: Temperature, 38° C.; pulse-rate, 96.

On account of this rise, the exit wound was freely opened up, some clot evacuated from amongst the muscle, the damaged parts of which, and the skin edges, were cut away. No wound was found in the inner synovial pouch. A 5% salt pack was applied. During the next ten days the temperature was between 37.7° and 38.3° each night. After that it fell to normal, and he was sent to England with his wounds nearly healed.

(ii.) *With Bone Injury.*

Cases with bone injury of higher degree than the simple punctured bone wound are rarely seen at a base hospital. The reason for this is that the more extensive bone injuries, shattering of both condyles, for example, are usually accompanied by such damage to soft parts, vessels, or nerves that an amputation is done immediately the condition of the patient allows. Some cases, however, may be of such a nature as to make excision feasible.

When the injury to the bone is limited to a fissuring of a condyle or of a tuberosity with exit wound of small or moderate dimensions, conservative treatment is still indicated, as in the following case.

*Illustrative Case.*

*Case IV.*—Pte. A.L., admitted on October 19, 1916, was wounded on the previous day. There was a punctured entrance wound above and to the inner side of the patella. A larger exit wound was situated behind and below the head of the fibula. The joint was full of blood and X-rays showed the external tuberosity completely split off from the rest of the bone, and a good deal of comminution of the head of the fibula. Both wounds were excised as completely as possible, fragments of the fibula being removed, and the wounds sutured, the posterior one being first filled with urea.

The joint was then opened by a separate incision and washed out with eusol, followed by normal saline solution, and sewn up in layers.

The subsequent course was quite normal, the temperature never being raised after the second day.

In such an injury produced by a bullet in normal flight, infection, if it occurs, will only be introduced subsequently to the wound, by a spread from without inwards. There is no carrying in of the fatal shreds of clothing that almost invariably accompany the jagged shrapnel fragment, and consequently an excision of the exit wound down to and including the synovial membrane where possible, followed by lavage of the joint and suture of the membrane, offers a good prospect of safety for the joint.

#### (b) Shrapnel Bullet.

This ball, though larger and heavier than the rifle bullet, has a much lower velocity. As a result of this low velocity and its smooth surface it has only a very slightly destructive effect upon bone, as a rule making a fairly clean cut tunnel through cancellous tissue. Passing close to the surface of the bone, however, it commonly enough splits off a wedge-shaped fragment, 1.2 or 1.8 cm. in thickness, with the base at the joint line. Passing through the bone more medially, it seldom has this splitting effect, and a bullet from a shell bursting high will often lodge in the joint without penetrating bone, or imbed itself in the cancellous tissue. (Cases V. and VI.) Where it has succeeded in traversing the bone it is often found that the skin beyond has proved an insuperable obstacle to the nearly spent bullet, and it can be felt subcutaneously. The wounds caused by this agency, on the whole, do well under suitable treatment. As a result of the smooth surface there is seldom any in-carrying of clothing; the hole produced in cloth by shrapnel bullet is quite an inconspicuous affair; and from the low velocity there is an absence of gross splitting or explosive effect upon the bone, or upon the soft parts, if there be an exit. I have notes of only one case in which a piece of clothing has been found in the wound, and this has been the only case which has come to arthrotomy for drainage, a rather striking example of the part played by this type of foreign body in the production of severe infection. The size of the entrance wound appears to be responsible for the rather greater proneness to infection that such a wound shows, as compared with the simple rifle bullet wound. Another possible factor in this liability is the bruising of the edges of the wound, which, if unexcised, does not show the same tendency to scabbing and early healing as is the case with the puncture caused by the pointed rifle bullet. The diameter of the actual wound, apart from the bruising, is about 0.8 cm.; if there is an exit wound it may be 1.25 cm., or a little more across, both more or less circular. The wound in the synovial membrane, in the same way, does not exhibit a tendency to close, with the result that blood-stained synovial fluid can often be expressed along the track. This, too, no doubt, plays a part in delaying healing.

As a result of experience, one has come to class all injuries caused by shrapnel bullet, whether of the knee-joint or elsewhere, as rather more liable to infection than a bullet wound, but infinitely less so than any shell or bomb wound. Of eleven cases of which I have notes (eight personal and three under Major C. S. Browne), two became definitely infected. One of these, previously alluded to, in which a piece of cloth was removed from the joint, was seriously infected with Gram-positive bacilli (anaerobic) and cocci, and needed a wide transverse arthrotomy. Another, a mild streptococcal infection, responded to aspirations and lavage of the joint, whilst in the third the patient had a raised temperature which, for about seventeen days, suggested a very mild joint infection; this subsided without any further treatment than complete rest.

The knowledge, then, that in such cases infection, if it is to occur, will almost always be by spread along a track from the surface, at once suggests the treatment: excision of the wound and exclusion of the joint. This will remove the bruised tissues down to bone or synovial membrane, and the edges of this, too, are then excised and, later in the operation, sutured. The joint is cleared of the blood-stained fluid or clot it contains, being further opened by a suitable incision, if thought necessary, for inspection or access to damaged bone or cartilage, or removal of a bullet free in the cavity. Occasionally, where the joint has been penetrated *viâ* a tunnel in the tibia or femur and the bullet removed from an extra-articular site, there may be no sign of fullness or reaction in the joint. In such a case it is probably unnecessary to open and wash it out, rest and close watching being sufficient.

*Illustrative Case.*

*Case V.*—Cpl. T.W.M. was wounded on March 20, 1917, and was admitted on March 23, 1917. The wound of entry was to the inner side and above the right knee. He was operated on at a casualty clearing station about 36 hours after wounding. A small excision of the wound of entry (skin only apparently) had been carried out. The shrapnel bullet, which must have traversed the joint, was removed from under the skin at the outer side of the calf.

On admission the temperature was 37.7° C., and the pulse-rate 80. An X-ray plate showed no sign of bony injury. The joint was neither swollen nor tender, but there was some reddening of skin below knee on inner side of leg and some general swelling of the calf.

No treatment was given beyond hot foments to the leg. The swelling and redness soon subsided and the joint remained perfectly normal.

Usually a specimen of the contents is secured by an exploring needle at the outset for bacteriological examination. If there is a track, passing through the bone, any cancellous débris should be curetted out, but if the bullet be retained, it will be necessary to enlarge the track leading to it by the use of the gouge before it can be extracted. Any bone split off is removed if it appears likely that it will lead to an irregular joint surface, or flakes or cartilage are cut away.

The joint is then thoroughly washed out with eusol solution (0.5%), a funnel and tubing being used, and the leg flexed and extended, so that the whole joint cavity is reached by the fluid. The synovial membrane is then sutured with catgut, and only the more superficial parts remain to be dealt with. If the case is seen moderately early (48 or less hours), and there be no obvious sign of infection in the superficial tissues and a satisfactory excision of the whole wound has been feasible, the wound may sometimes be closed, capsule and skin being sutured separately. If of longer standing and more doubtful character, it is wiser to leave the parts superficial to the membrane open, placing Carrel's tubes thereon, or simply lightly packing with eusol gauze, and carrying out a second-

ary closure later on. Where the wound leads to the joint through a tunnel in the bone there is, of course, no question of dealing with the synovial membrane, and the treatment will be excision down to the bone, followed by light packing or suture on the merits of the case. The ball, if retained, is removed through an incision lateral to the patella or in the supra-patellar pouch, according to its position. Any exit wound is dealt with in the same way.

Difficult cases are those in which the entry is through the popliteal space, as here anatomical considerations prevent a complete excision. The wound of skin, subcutaneous tissue, and deep fascia, with adjacent fat, are excised, and the remainder of the track is lightly packed with eusol gauze or gauze soaked in hypertonic saline solution (5% to 10%), after thorough irrigation.

In any case, where removal of the ball appears easier or less damaging through a fresh incision, this should be done, and this wound should be sutured, if it has opened the joint. If, however, it is for the purpose of removing a subcutaneous bullet, or one which is lying in an extra-articular area of tibia or femur, the wound should be lightly packed and not sutured. It need hardly be added that before any operation is undertaken, X-ray plates in the two planes are necessary. I will not mention here the complication of fracture of the patella, as it will be referred to in the next classification.

The following cases are typical and illustrate some of the features alluded to above.

*Case VI.*—Pte. H.J.S. was wounded on August 15, 1916, and admitted on August 17, 1916. The temperature was 37.7° C., and the pulse-rate 68. The wound of entry was about 5 cm. above the joint line on the outer side of the knee. The joint was not full, blood-stained synovial fluid escaping on pressure. An X-ray examination showed a shrapnel bullet in the centre of the joint and a portion of the outer surface of the external condyle split off. Excision of the wound down to the entry into bone was carried out, with extension downwards to the joint line. The fragment of bone was removed, and the bullet, which was jammed between the condyle and the spine of the tibia, manipulated to the front of the joint and there secured. The excision wound was left open, eusol gauze being packed down on to the bone surface around a tube passing to the bullet hole. On the fourth and sixth days after operation, the temperature reached 38.3° C.; fluid aspirated showed no sign of infection, and the pulse-rate rarely exceeded 90, generally being about 80. The temperature gradually dropped to normal, and he was evacuated well.

This was one of my first cases, and I believe that now, by using Carrel's tubes passed into the joint and laid on the external wound, a similar case would escape the mild infection that was probably present in some part of this joint.

*Case VII.*—Pte. Y. was wounded on October 1, 1916, and admitted on October 2, 1916. The temperature was 37.7° C., and the pulse-rate 96. The wound of entry was almost in the centre of the popliteal space of the left knee. The X-ray plate showed a shrapnel bullet just above and behind the patella, evidently free in the joint. An inner lateral patellar incision was made, and much blood-stained fluid, white fibrinous clot and small blood clots were evacuated. The bullet was found free in the joint towards the outer side and removed. On flexing the knee the bone wound was found at the articular margin of the inner condyle, flakes of cartilage being raised in a trap-door fashion. Removal of the bruised edges of the bone with the gouge was followed by free bleeding, which was stopped by plugging with muscle cut from the *vastus*. After freely washing out with eusol solution, the capsular synovial membrane was so sutured as to exclude this opening from the joint, and the wound closed in layers.

The posterior wound, including the deep fascia, was excised, and a short length of drainage tube passed just deep to the fascia. By the sixth day the temperature was normal, and the joint gave no further trouble. The effort made in this case to exclude the bone wound of entry from the joint cavity was, I now believe, quite unnecessary.

### (c) High Explosive Shell or Bomb Fragment or Deformed Bullet.

Although these missiles vary greatly in size and shape, they are classed together, since they are alike in possessing a rough and irregular surface. The great majority of all wounds are caused by their agency, particularly by shell and bomb, and thus the majority of all wounds are infected. For in passing through clothing, it is practically inevitable that the rough edges or surfaces pick up some threads of fabric or drag in larger or smaller portions of cloth with them, and thus infection is at once deeply implanted in the wound. Whilst occasional small fragments may be sterile, both clinically and on bacteriological tests, such cases can only be looked upon as surgical curiosities and not as in any way justifying the slightest departure from established custom in dealing with them.

It is to this implantation, as opposed to the mere soiling of the surface in (*a*) or (*b*) that the malignancy of such wounds is due. Only by immediate operation, that is to say, within 12, or at the very most 24 hours, can one hope to obtain a large proportion of successful, *i.e.*, quite aseptic, results. The surgeon at a base, receiving patients on an average 48 hours after being wounded, works under a heavy handicap, one which too often he will never overtake. The casualty clearing station then is the ideal place where all these operations should be done, and a larger and larger number of cases are now being dealt with there.

The fragment (in common parlance "F.B."—foreign body) may vary in size from one smaller than a grain of wheat to one weighing 30 grammes or more, of intensely high velocity or nearly spent, and entering the joint from any surface and in any direction. It is convenient to consider separately cases with and without bone injury.

#### (*i.*) *Without Bone Injury.*

The wound will almost necessarily be to the front or sides of the joint, entering directly, or after an oblique course. If a direct entry, it is quite easy to excise the wound thoroughly down to and including the synovial membrane. A description of the excision of such a wound may be given here, as applying to the initial procedure of most cases.

An elliptical skin incision, skirting the wound at a distance of 4 to 8 mm., is made, where possible in a vertical direction, so as to allow of its convenient enlargement upwards or downwards at a later stage. All vessels are clipped as soon as divided, so as to keep the field as dry as possible. With toothed forceps the skin at one end of the ellipse is picked up and steadied, and the incision deepened through the deep fascia, the muscle or tendinous expansion and the synovial membrane, care being taken to cut wide of the track throughout. For this it is necessary to

use a sharp scalpel, and to have previously determined the exact direction taken by the foreign body. If it be found that the track, by mischance, has been cut into, the remainder will be removed by snipping out with a sharp pair of curved scissors. It is most important to be certain that the whole of the original wound in the synovial membrane has been excised.

When the foreign body has entered more obliquely, it is often impossible to excise the track *en bloc* in this way, and after excision of the skin wound, and enlargement of this in the required direction, one can only excise the track through deep fascia, muscle or expansion, and synovial membrane *seriatim*. This may be facilitated by previously packing it with a gauze wick squeezed dry from tincture of iodine.

If the wound has been caused by a glancing fragment tearing open the joint and not lodging (as proved by X-ray examination), there simply remains to wash the joint out with eusol solution, as described earlier, to remove blood clot, blood or the fibrinous coagulum that is sometimes found present. The synovial membrane is then sutured with catgut, and if the joint is not obviously infected and the excision has been thorough, the aponeurosis may also be united. If the case is doubtful it is wiser to suture the synovial membrane only partially, leaving room for one or two Carrel's tubes into the joint and for a return flow alongside them. One or two sutures may be put in the aponeurosis, so placed as not to interfere with the flow through the tubes. Another tube should be laid in the superficial wound, and the usual two hourly instillations commenced through all.

A specimen of the contents of the joint will have been taken at the outset for bacteriological examination.

*Illustrative Case.*

*Case VIII.*—Lce.-Cpl. C.W.S. was struck on the right knee by a large piece of shell, on June 8, 1917. He was admitted on June 10, 1917. His temperature was 37.4° C., and pulse-rate 64. The wound was about 5 by 2.5 cm., just above the patella, from which blood-stained synovial fluid could be expressed. An X-ray examination showed no foreign body or apparent bone injury.

Operation on June 11, 1917. The margins of the skin and tendinous expansion, which had been completely divided at its insertion into the upper border of the patella, were trimmed away. The synovial pouch was found to be freely opened, and on investigating the interior of the joint four or five pieces of cartilage and bone were found chipped off the articular margin of the outer condyle. The edges of the synovial wound were excised, the joint was washed out and the synovial edges were sutured, room being left for a Carrel tube and exit for fluid.

The expansion was sutured to the top of the patella and another tube placed beneath the suture line. The skin was not sutured. No bacteriological examination was made.

Two days later the temperature was 37.7° C., and the pulse-rate 80. There was no pain or tenderness. The Carrel tube was removed from joint cavity. On the 17th, as the wound was perfectly clean, the other tube was removed, and only a eusol gauze dressing applied. After the 19th the temperature and pulse remained quite normal, and he was evacuated with a healing wound on the 24th.

When, on the other hand, the fragment has lodged in the joint cavity, it is as well to increase the size of the excision wound sufficiently to have easy access to it, or, if necessary, to incise the capsule longitudinally elsewhere. The foreign body is then removed and any damaged synovial membrane at its lodgment site should be cut away. (Case IX.).

If the foreign body is a very small one and the joint contains only blood-stained synovia, it may be possible, after the routine lavage, to close the joint to the extent spoken of above. When it is of larger size, and certainly if the joint contents are turbid or in any way suspicious, the joint must be left open and Carrel's tubes passed across the joint behind the lower part of the patella and into the supra-patellar pouch. It must be remembered that here we are dealing with cases about 48 hours old, and while similar wounds might be safely closed at a casualty clearing station, at this later period it is wiser to err on the side of caution. The time these tubes will be kept in depends on the course run by the case. Some temperature reaction is nearly always noticed after irrigation of a joint with eusol, but this should subside within about three days, gradually reaching normal. If meanwhile the pulse has remained quiet, in the neighbourhood of between 80 and 90, and the joint is free from pain and with but slight tenderness, and any discharge found on the wound and dressings is small in amount, glairy and clear (due to the effect of the hypochlorite solution), the tubes may then be removed from the joint cavity, and placed upon the surface of the wound until healing has commenced. By this time the synovial membrane will have united if the incision in it has been small. If larger, the surface tubes are better retained until the whole superficial wound can be closed up by strapping or suture.

While most of such cases present no difficulty, either in removal of the foreign body or their general treatment, others are less simple.

When multiple small wounds are present over the knee and it is difficult, even with plates in both planes, to determine which of the fragments are actually in the joint, the best method is at once to turn up the patella by a horseshoe incision and to explore the joint from within. Such treatment was adopted with success in the case of Pte. A.E.B., of which the lateral view is given.

Where the wound is in the popliteal space and the joint is opened from behind a complete excision of the track is impossible. The following case gave some anxiety for a time.

*Case IX.*—Pte. F.G.P. was wounded on May 3, 1917, and was admitted on May 5, 1917. The temperature was 39° C., and the pulse-rate 96. There was a wound in the right popliteal space. The knee-joint was swollen, tense and painful. It had been gradually getting more swollen. An X-ray plate showed a foreign body between the condyles at the back of the joint (see plate Case IX., May 6, 1917). A posterior incision was made, and the wound was excised as far as possible. The foreign body, which was lying in a wound of the ligament of Winslow, was removed. Blood-stained synovia was evacuated through this. Immediate smear showed some increase in leucocytes, but no organisms. Two Carrel's tubes were passed into the joint by parapatellar incisions, and two through the popliteal wound up to the hole in the ligament.

May 8, 1917. The joint tubes were removed.

May 15, 1917. He was doing well. The temperature had been up to 38.3° C. for several days, but had fallen to 37.2°. The posterior tubes were removed. The wound was quite clean. He was evacuated on May 18, 1917, with a normal temperature.

When bacteriological examination of the fluid has shown the presence of large numbers of leucocytes without organisms, or culture of the fluid, or of the foreign body itself has furnished a growth of some

such relatively benign organism as *Staphylococcus albus* or enterococcus, further treatment is necessary. If the excision wound has been a free one, allowing a ready exit from a lateral pouch, it will be found as a rule that careful immobilization of the joint and the retention of the Carrel tubes within it for a further period will be sufficient to overcome the mild infection present. If the excision wound is small or unsuitably placed, it is better to make one or two parapatellar incisions and to pass the tubes through these across the joint and into the supra-patellar pouch.

Under such treatment it is likely that any small elevation of pulse and temperature that has been present, will subside and the case pursue a favourable course.

*Case X.*—Pte. G.H.G. was admitted on February 17, 1917. He had been wounded two days before. The wound was situated on the lower side of the patella. An X-ray examination revealed a foreign body on the inner side of the joint cavity.

The wound through the *vastus internus* was freely excised. The joint was opened by an outer parapatellar incision. The foreign body was found lodged in the swollen synovial membrane at the outer articular margin of the femur. The cartilage had been scored in its passage through the joint. The foreign body was removed and surrounding the synovial bed excised. A little pus was present in this bed. Cultures from the pus and the fibrin clots in the joint contained *staphylococcus aureus* and *albus*.

Two Carrel's tubes were inserted across the joint. A crab splint was applied.

February 26, 1917. The patient had been quite comfortable. The pulse and temperature were normal. There were no organisms in a smear from the exudate on the Carrel tubes, which were therefore removed from the joint.

*(To be continued.)*

## A PORTABLE APPARATUS FOR THE ADMINISTRATION OF WARMED ANÆSTHETIC VAPOUR.[1]

By **C. Dyring, M.B. (Melb.),**

*Captain, A.A.M.C.; Anaesthetist, No. 5 and No. 11 Australian General Hospital; Honorary Anaesthetist, Women's Hospital, and Eye and Ear Hospital, Melbourne.*

In many of the operating theatres of the large American hospitals there has been installed elaborate apparatus for the administration of warmed anæsthetic vapour.

With its cylinders, stop-cocks, pressure-gauges and weird tubing, the apparatus, although quite efficient, and suited to the conditions obtaining in the operating room, is precluded by its bulk and weight from being employed elsewhere. Although it is acknowledged by almost all anæsthetists of repute that warmed anæsthetic vapour has manifest and great advantages over the ordinary cold vapour, whether given by the open, semi-open or closed methods, the difficulty has always been that a handy portable apparatus has not been forthcoming. Even Gwathmey's portable apparatus, as illustrated, is too heavy and cumbersome for ordinary outside work.

Some months ago I was struck with Gwathmey's experiments on animals with lethal doses of cold and warmed chloroform vapour, in which he showed that warmed chloroform vapour and air took almost three and a half times as long to kill as cold chloroform vapour and air, the experiments being conducted under conditions as nearly equal as possible. Further, there is his statement on page 66 of his book, to the effect that, "only a few experiments were conducted with ether, but the number was sufficient to fully convince me that ether acts similarly to warm chloroform and warm nitrous oxide, that is, it is twice as safe as shown by the fact that it took twice as long to kill the animals with warm ether vapour as with cold."

He further says: "Statistics quoted would seem to support the contention of the authors that warmth, when applied to anæsthetics, is a distinct factor of safety, and it will be seen that chloroform, when given under favourable circumstances, is equal to ether in regard to immediate safety." The "favourable circumstances," of course, being the condition that the vapour be heated.

From an American anæsthetist of Gwathmey's standing and from the well-known predilection of Americans for ether administration, this is a striking statement, but he goes on to say, and puts the remarks in italics for the purpose of emphasis: "If we should administer the chloroform with oxygen in a southern climate (*i.e.*, in America), the probability is that we might have an anæsthetic practically free from danger; in the Southern States chloroform immediately rises in value as regards life."

The experience of anæsthetics in Egypt has led surgeons to the same conclusion, for in that climate it is almost impossible to obtain deep anæthesia with ether, as the evaporation is so rapid. During the time I was there at hospital I made use almost exclusively of chloroform as an anæsthetic, and invariably with satisfactory results, although many of the cases were of such a nature that, in a colder climate, I would have chosen open ether as being safer. The men took the chloroform well in all cases.

Flagg, in his book, is not so enthusiastic on the subject of warmed ether as is Gwathmey, but he does not seem to have conducted experiments as did Gwathmey, and the reasoning of the latter seems to me unanswerable. Flagg makes the statement, on page 69 of his book, "the value of warming ether vapour which is nil."

In view of the overwhelming evidence of the advantages of warmed anæsthetic vapour and of the fact that so far as I know there is no portable handy apparatus available, the idea occurred to me to make use of the ordinary thermos flask for the purpose of warming the ether vapour. The result is the apparatus made for me after a few experiments.

My first model was made almost entirely with rubber tubing and had an ordinary rubber hand bulb for forcing the air through the ether for the purpose of vapourizing it. I had this model in almost constant use for some months at the Base Hospital, at the Women's Hospital, at the Eye and Ear Hospital, and in my private work, and finding that this method of giving anæsthetics was a decided improvement, I suggested various improvements, which have been carried out for me.

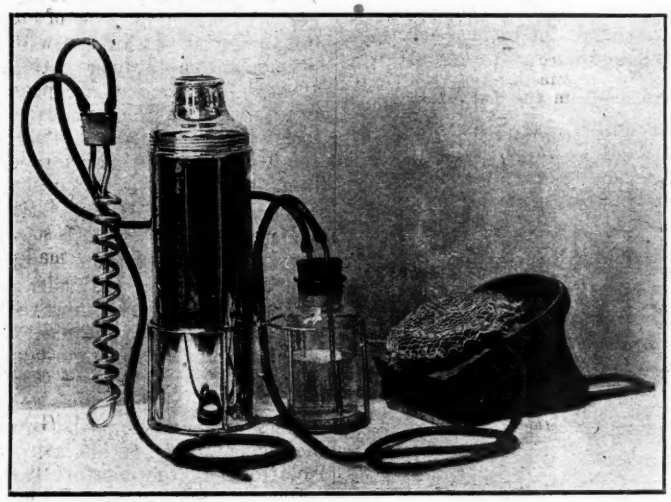
The apparatus consists of a stand containing the bottle holding the ether, or the mixed chloroform and ether, and the thermos flask. The rubber cork of the

[1] Read at a meeting of the Victorian Branch of the British Medical Association, on May 1, 1918.

anæsthetic bottle is perforated by two metal tubes, one of which goes almost to the bottom of the bottle and the other just through the cork. A long piece of rubber tubing connects the longer tube to the foot-bellows and a small piece of rubber tubing connects the small tube to the thermos flask.

Fitted into the thermos flask is a closed spiral of copper tubing of the largest diameter compatible with the size of the mouth of the flask. To one lip of this spiral is attached the rubber tube coming from the ether bottle, and attached to the other lip is another tube leading to the face piece or mask.

The object of the spiral copper tubing is to give as long a passage as possible to the ether vapour as it passes through the thermos flask. The thermos flask is almost filled with boiling water or with water as nearly boiling as possible, the rubber corks are inserted and the apparatus is ready for use. Air is pumped through the liquid ether, and the vapour passes through the hot spiral of copper and is delivered to the patient warmed.



It is needless to say that the water in the thermos flask remains at almost the same temperature for hours, and consequently the vapour is delivered to the patient at an almost constant temperature, no matter how long the operation. The loss of heat on the passage of the ether vapour through the copper spiral is negligible.

There are suggestions in the various works on anæsthetics as to the warming of the ether by placing the ether bottle in a vessel of hot water and also of forcing the ether vapour through rubber tubing while it is lying in a basin of hot water, but the objection to these procedures is that the hot water requires constant renewal, especially so in cold weather.

The thermos flask maintains a temperature which, for all practical purposes, is constant for three or four hours.

During the experimental stages I used various materials inside the thermos flask. The chief difficulty encountered was the restriction caused by the narrow neck of the flask. A glass helix did not warm the ether vapour sufficiently; a long rubber tube was more successful, although a somewhat thick tubing had to be used to avoid kinking, with the consequent stoppage of the delivery of the vapour. Metal was next tried, and at first was not successful, as the vapour was not delivered in sufficient quantity, owing to the small calibre of the tubing. Finally copper tubing of about the calibre of ordinary stethoscope rubber tubing was used, with very satisfactory results.

I have now had about eight months' experience with the apparatus, and confidently maintain that it has many advantages over the open ether, semi-open or closed ether administration. These advantages can be brought under three heads, *viz.*: (*a*) those to the patient, (*b*) those to the anæsthetist and the operator, and (*c*) the economic advantages.

**Advantages to the Patient.**

1. It is safer. Gwathmey's experiments quoted above show this.
2. The vapour is warmed, there is less danger of post-anæsthetic pneumonia and bronchial complications.
3. There is less vomiting both during and after the operation.
4. There is less shock, as the body heat is maintained and not lost as in open ether administration.

**To the Anæsthetist.**

1. There is a much more even level of maintenance.
2. The colour is invariably good; I have not seen a case of cyanosis during the time I have been using the apparatus.
3. The pupil remains contracted, the breathing is deep, regular and natural, and the pulse is normal.
4. There is a lessened tendency to the disturbance of the vomiting centre during the operation.
5. The level of maintenance is easily raised or lowered by a more or less rapid action of the foot-bellows.
6. As the face mask is closely applied (the oxygen supply being delivered with the ether vapour), the well-known advantages of re-breathing are obtained and, if there is an advantage as some maintain in having moistened warmed ether vapour, this also is obtained by the moist breath of the patient.
7. There is the further advantage to both anæsthetist and operator in that the odour and the inhalation of the surplus escaping ether in the operating theatre is reduced to a minimum. Even after a couple of hours, the air in the operating room is not laden with ether fumes as in the open method.
8. The apparatus itself costs only a few shillings, and if rubber tubing be used throughout, any individual can improvise it.
9. The apparatus is portable and may be packed into an ordinary hand bag. It can be used anywhere and at all operations boiling water is at hand—the only requirement for it.
10. It can be used as an ordinary Junker's inhaler, for the delivery of warmed ether vapour, and by attaching a gum-elastic catheter instead of a mask there is at hand a portable intra-tracheal apparatus.

**Economy.**

With this apparatus about 60 c.cm., certainly not more than 80 c.cm., of fluid ether per hour are used. Those of you who have had any experience of much anæsthetic work, may draw your own conclusions as to the economic saving.

## RESEARCH AND THE GENERAL PRACTITIONER.[1]

By **W. T. J. Newton, M.B. (Syd.),**
*Campsie, New South Wales.*

The ultimate aim of all medical research is the treatment and prevention of disease.

It is eminently desirable that a medical man be generally well informed, but what is still more desirable is that he shall be a skilful practitioner. It is quite possible to be the one without being the other. The combination is what we hope to see commonly accomplished. The tendency of recent teaching has been to produce the first, leaving the second quality to develope itself, or to remain in a condition of imperfect evolution. We hear it asserted that the highly-educated medical men of the present generation are not more successful in practice than their less accomplished but more practical predecessors. This is a very serious reproach to all our recent advances in scientific medicine, to our modern instruments of precision in diagnosis, and even to our progress in rational therapeutics, with the remedies added to our armamentarium in late years.

We must distinguish between medicine as an art and medicine as a science. At present the aspect usually presented to us is that of it as a science. The stethoscope, laryngoscope, ophthalmoscope, cystoscope, microscope and other diagnostic aids have done much for us in the recognition of disease, and have rendered services to medicine as a science. But can medicine as an art boast of such magnificent advance? As our instruments of precision have become more numerous as well as more exact and trustworthy, we have insensibly come to regard the information thus furnished to us as of primary importance; while the information derived from a careful collection of rational symptoms, from a cautious consideration of the general condition, has been awarded a subordinate position. In fact, we attach an exaggerated importance to one series of facts and under-estimate the value of others.

At present physical signs preponderate in the mind of the practitioner over rational symptoms, to the detriment of the patient and, possibly, to the detriment of the profession. The public cannot be expected to estimate us by any other measure than that of our usefulness. It is all very well for a patient to feel that his medical man is a gentleman, that he can make a skilful diagnosis, and that he has had experience in foreign schools, but the essential thing, after all, is confidence in his power to aid him when stricken and prostrated by disease and accident. The latter is our actual business and occupation in life, and it is here that success is most to be desired. And we have been successful to a certain extent. We can perform long and tedious operations without the patient feeling one pang of pain. We can give relief, speedily and efficiently, by hypodermic injections of morphine. We can enable an injured heart to develope compensatory growth, and so preserve for years many valuable lives. By improvements in our foods we can rear successfully many children who, not many years ago, swelled the death-rate of those who die under five years of age. By a carefully selected diet, the diabetic patient can be preserved a useful life for years. The widespread use of antiseptics and disinfectants is working wonders in relation to the arrest of disease.

The work which has been done in this great war in the way of inoculations has done much in the prevention of disease.

But this is not what I want to make available; it is the carefully acquired knowledge of the individual. This knowledge, however useful to himself and his patients, gives little or no additions to the general stock of information, because it remains individual knowledge, derived from experience, which dies with its possessor because he cannot formulate it. He can treat one complex case admirably from his previous experience of like cases, but he does not bring it within the sphere of cognizance of others, to enable them to treat such or similar cases. If such experience could be rendered available a great step would be secured. A man should not only learn for himself, but he should gather and garner for his successors, as his predecessors have done for him.

There is much still to be done, much to be learnt, much to be investigated, before medicine shall have attained its maximum of utility. But there exist also ardent minds, enthusiastic and undaunted workers, who will in time, and with infinite patience, lay deep and firm the foundations of a practical medicine. The prospect contains much to cheer us, much to encourage us to work and wait. If the work of the individual has no apparent fruition, and he passes away without the gratification of seeing the desired outcome of his labours, there exists the consolation and the comfort that good, honest work is never ultimately lost, and that what has been done by him will bear fruit in the hands of another, and that the sum total of human knowledge is the better for him and his work, even though the fruition be delayed until he himself is forgotten in the silent tomb, unconscious of the busy life which is reaping what he has sown. We living now receive the benefits accruing from the work of past toilers, and so in return must we do something for those who will follow us, and do it without a grudging spirit, but simply with an honest consciousness of duty—done, to be done. There is a certain element of selfishness in the life of those who take what medicine has slowly accumulated, and use it merely for their own advantage and individual interests, without a thought of making some return. So, if we feel that others may benefit by our labours, we must not repine, we reap that which others before us have sown. The personal benefit is the consciousness of duty done, which is far more than hope of reward; the consciousness also that we have added our brick in the building of the temple of knowledge, an aggregation of individual bricks, each one of which has its place and its value.

[1] The Presidential address delivered at the annual meeting of the Western Suburbs Medical Association (New South Wales), on April 24, 1918.

The Medical Journal of Australia.

SATURDAY, JUNE 8, 1918.

## Wanted—A Hundred Men.

Two significant announcements have recently been made concerning the relations of the medical profession to the war. The first is that no objection is to be placed in the way of medical students of the first, second or third years who desire to enlist as combatants in the Australian Imperial Force, and the second is that one hundred junior practitioners are required within the next six months for service with the Army Medical Corps. It will be necessary to return to the first matter in the near future. Divergent views have been expressed by prominent members of the medical profession in the public press on this subject. Junior students will need guidance in the determination of their actions in the interests of the Empire and of Australia, and the utmost caution is essential before this guidance is given. The other matter is more urgent and less difficult to handle. The needs of the military authority can be supplied, but if the suitable men are taken for active service, others, less young and less adapted for field work, must step into their places in the Commonwealth. Compulsory enrolment has been thrown overboard. Living from hand to mouth on a voluntary basis is highly unsatisfactory. The position can be met if those who favoured compulsory enrolment, would place their services at the disposal of the military authorities on the conditions which were set out in these columns a few weeks ago. The onus of conserving the strength of the profession lies with the Branches of the British Medical Association. A move in the right direction would guarantee the best distribution of the services of each and every member. But it must be done speedily.

### RESTORING THE MAIMED.

The Orthopædic Conference of April 24 and 25, 1918, of which we published a full account last week, is a healthy sign of the recognition by the military authorities of the necessity to introduce order and logical arrangement into the military medical service. The Deputy Director-General, Medical Services, is to be congratulated on his courage in attacking the whole subject of military orthopædics without imposing any limitations on the scope of the discussion. It would appear that the only limitations which the members of the conference placed on the range of their remarks were the confines of Australia. The object of the conference was to devise means for restoring the functions of soldiers who have been wounded or otherwise incapacitated and who have returned to Australia. While we realize that the problems involved are replete with difficulties, we regret that prevailing conditions prevented the members of the conference from reviewing the larger question and endeavouring to establish a new, more efficient organization, which would embrace the care of incapacitated soldiers of the Australian Imperial Force both at home and abroad.

The Army Medical Service of any country at war has two great functions to fulfil. The first is to take measures to keep the health and physical condition of the troops at a high level. This function includes the expeditious treatment of wounded or sick soldiers with the object of enabling them to return to the firing line without avoidable delay. The second function is to restore as much of their lost physical or mental power as possible to those whose wounds or other war-begotten infirmities render further military service out of the question. It is obvious that the best results can only be achieved if the means to that end are applied immediately the nature of the disability is recognized, and are continued until medical science can do no more. The nation accepts the responsibility for the application of the utmost effort to achieve the best results in all cases. Everyone is agreed that this obligation must be met, no matter what the cost may be, in the interests of the brave men who have faced the horrors and dangers of the war. From an economic point of view, it is unsound to permit a

returned soldier to become an idler, when, with the adoption of suitable measures, he might perform productive work. Any scheme having for its object the restoration of lost working capacity of incapacitated soldiers, must be planned with a full recognition that nothing unfits a man for ordinary peaceful occupations like war service, and that if work-shyness be added to physical disability, the problem cannot be solved merely by the provision of an artificial limb factory or the establishment of a curative workshop. It is further necessary to adapt the restoration plan to the characteristics of the men to be handled and to make full allowance for the effects of what may be termed national habits. To ignore the independent spirit of the Australian in building up a scheme would be to court failure. In spite of this, it would be foolish if no consideration were given to what has been done elsewhere. The world has many lessons of value to offer us in this connexion. A single example may be quoted in support of this. Almost insuperable difficulties have been met and overcome at St. Dunstan's in London, where blinded soldiers are re-equipped for the struggle of life, despite the fact that not a single patient enters this Home who is not depressed at the apparent hopelessness of his condition. Success is achieved, because the inmates are amenable to the instruction and control of those in charge from an early date until the utmost output of human ingenuity has resulted in the return of confidence and in the acquisition of fresh powers of productive work. The lesson to be learned from this institution is that marked success will not be secured unless the work of restoration be begun early and unless this work include a skilled mental training—a will teaching. In the next place, it is essential that the efforts made in France or Egypt and in England and those made within the Commonwealth should be co-ordinated. At the conference men of experience spoke with emphasis concerning the need of employing highly trained assistants, such as masseurs, not only here but also on board the transports. Of even greater importance is the proper selection of the medical officers who have the care and control of soldier patients. Want of individual and skilled mental guidance is as dangerous as the lack of special orthopædic measures. A single day spent in a depressed state of mind may work havoc in a wounded man's mind. The medical officer has a great advantage while his patient is still a soldier. Discipline can and should be exercised for the individual's good and, while it would be foreign to our nature to introduce compulsion ruthlessly in connexion with the treatment of war disabilities, the value of requiring obedience from a soldier, even when he is in a hospital, cannot be over-estimated. The next general principle that should be adopted is that the institutional treatment of incapacitated soldiers before discharge should be conducted as far as possible in special and not in general hospitals.

The members of the conference recognized the importance of early curative training. They advocated the establishment of so-called curative workshops in connexion with many of the military hospitals. This term is perhaps an unsuitable one. Patients should not be reminded that any part of their surgical or medical treatment partakes of the nature of work. Treatment laboratories or treatment annexes would be better. The continuity should not be interrupted when the man is discharged from the Army. It is true that the transition is abrupt and significant, but it should be the aim of all concerned to render this transition as little noticeable as possible. The military authorities are opposed to a long delayed discharge from the Army. We regret that this decision has been arrived at, for the longer the man is subject to military control, the better would be the chance of gaining a beneficial influence over him. To overcome one of the greatest difficulties with which the nation is faced, there should be the closest co-ordination between the Army Medical Service and the Repatriation Department. Vocational training should be as far as possible a direct continuation of the curative training begun under the control of the medical officer. The medical officer should at all times have the assistance of those specially skilled in technical training, and later, when the man passes out of the Army, the responsible heads of the various departments in the vocational training schools should have the constant advice and assistance of skilled medical practitioners. All this co-ordination and continuity can only be achieved if one highly trained and specially competent medical expert be

placed at the head of the service for the restoration of the maimed and is made responsible for the efficient working of the whole department. The task would be an onerous one, but Australia has men with large minds, and large hearts, who could carry out this task with benefit to the whole community.

### AUTO-AGGLUTININS.

The power of a person's blood serum to agglutinate his own red blood corpuscles *in vitro* has been noted on very rare occasions. The occurrence is not difficult to recognize, since, when pronounced, a blood count becomes practically impossible with the ordinary technique. Landsteiner pointed out in 1903 that when the phenomenon occurred with the blood of horses and other animals, the agglutination did not take place when the blood was warmed. Little of the actual nature of the phenomenon has been made out, and it is consequently of some importance that the blood of a married woman, exhibiting this unusual power, was carefully investigated by Drs. Mildred C. Clough and Ina M. Richter.[1] This woman was admitted to the Johns Hopkins Hospital, suffering from pneumonia. The mitral valve was affected. The first blood count was made without difficulty, but subsequent counts were impossible, unless the blood was warmed. The authors first found that the agglutinin was removed from the diluted blood with the euglobulin fraction, the ammonium sulphate method being employed. Subsequently they found that the agglutinin liberated from the stroma of laked corpuscles failed to give a protein reaction with Heller's test. Their researches showed that the auto-agglutinin was quite distinct from iso-agglutinin normally present in blood serum, and that it was present in the serum and not in the corpuscles. The corpuscles absorbed the agglutinin at low temperatures, leaving the iso-agglutinins in the serum. The auto-agglutinin remained in an active state for several months. Further experiments showed that this agglutinin was equally active on the cells of other animals as on the patient's own cells. On the other hand, they demonstrated definite differences between the auto-agglutinin and ordinary hetero-agglutinins. No auto-hæmolysin was found in the serum. Later experiments revealed that the presence of auto-agglutinins in this patient's serum was quite independent of the febrile illness from which she was suffering when the phenomenon was detected, and futher, that the blood of her daughter exhibited similar, although weaker, characters. The evidence adduced in support of these findings is considerable, and the authors have been most assiduous in their work of separating the three kinds of agglutinins. They admit that their investigations into the chemistry of auto-agglutinins is inconclusive, for the only fact elicited was that the action was definite when the amount of protein was less than one part in 20,000. Recent biochemical researches tend to show that many of the blood ferment phenomena are not physical manifestations of chemical compounds inseparably associated with globulin. There would seem to be little evidence that ferment action is really due to a definite chemical complex; it may ultimately prove to be a manifestation of a molecular rearrangement of certain compounds. The association of auto-agglutinin with iso-agglutinin and hetero-agglutinin in the blood serum of one person is of sufficient importance to indicate to immunologists the line of investigations they should follow, when an example of this rare phenomenon is again met.

[1] *Johns Hopkins Hospital Bulletin*, April, 1918.

## Naval and Military.

### CASUALTIES.

The 405th list of casualties, which was released for publication on May 30, 1918, contains the names of two medical officers, both of whom have been wounded, Captain Ewing George Thomson and Captain Richard Packer Wheeler, M.C. The latter was previously reported for the second time to have been ill.

### HONOURS.

The following members of the medical profession have received distinctions on the occasion of His Majesty's Birthday:—

Colonel R. B. Huxtable, D.S.O., has been created a Companion of the Order of Saint Michael and Saint George.

The following have been awarded the Distinguished Service Order:—

Lieutenant-Colonel W. E. Kay, 1st Field Ambulance.
Lieutenant-Colonel F. A. Maguire, 9th Field Ambulance.
Lieutenant-Colonel B. Quick, A.A.M.C.
Lieutenant-Colonel A. E. Shepherd, 8th Field Ambulance.
Major A. R. Clayton, 8th Field Ambulance.
Major A. T. Dunlop, 4th Field Ambulance.
Major T. C. C. Evans, 13th Field Ambulance.
Major D. S. McKenzie, 3rd Field Ambulance.
Major W. J. Stack, 1st Field Ambulance.

### APPOINTMENTS.

The following appointments, etc., have been announced in the *Commonwealth of Australia Gazette*, No. 79, of May 30, 1918:—

**Australian Imperial Force.**

*Army Medical Corps.*

Lieutenant-Colonel C. Yeatman, to command No. 1 Australian Auxiliary Hospital. 1st February, 1918.

Major A. F. Jolley, from No. 1 Australian Auxiliary Hospital, to command No. 9 Field Ambulance, and is granted the temporary rank of Lieutenant-Colonel whilst commanding. 22nd January, 1918.

Captain (temporary Major) H. Powell, M.C., ceased to hold appointment of Registrar No. 3 Australian General Hospital, and relinquished the temporary rank of Major. 16th January, 1918.

**Australian Military Forces.**

*Australian Army Medical Corps.*

Honorary Captain (temporary Lieutenant-Colonel) E. M. Humphery, to relinquish the appointment of Principal Medical Officer, and the temporary rank of Lieutenant-Colonel, and to be transferred to the Australian Army Medical Corps Reserve. 8th May, 1918.

Honorary Major E. Sinclair to be transferred from the Australian Army Medical Corps Reserve, and to be Principal Medical Officer, temporarily, with the honorary rank of Colonel, and pay at the rate of £800 per annum, inclusive of all allowances except travelling, whilst holding this appointment. 9th May, 1918.

*Australian Army Medical Corps Reserve.*

Walter Blaxland to be Honorary Captain (temporarily) for the duration of the war. 6th May, 1918.

The temporary honorary rank of Lieutenant-Colonel granted to Honorary Major E. Sinclair to be terminated. 8th May, 1918.

Honorary Captain H. S. Marsh to be transferred to the Australian Army Medical Corps, and to be granted the temporary rank and pay of Major whilst employed at No. 4 Australian Garrison Hospital. 15th May, 1918.

# Abstracts from Current Medical Literature.

## THERAPEUTICS.

### (198) Toxicity of Arsphenamine.

J. C. Sargent (*Journ. Amer. Med. Association*, March 30, 1918) reports the histories of five cases of arsenical intoxication due to arsphenamine. Arsphenamine is manufactured in New York, presumably in the same way as salvarsan, under the direction of the Farbwerke Hoechst Company, by the process employed in the manufacture of German-made salvarsan. The author has tested the contents of three ampoules which had not been cracked and in which the contents appeared similar to those of ampoules of salvarsan. The contents were dissolved in freshly-distilled sterile water and the solution treated with 15% sodium hydroxide in the usual way. During the previous six months, the author had given 200 doses of German salvarsan with the same technique. Five patients received the same solution of arsphenamine. A young woman was given 50 c.cm., containing 4 dg. arsphenamine. As she was leaving, after the injection, she fainted. On regaining consciousness vomiting set in. She complained of feeling cold. She recovered after 12 hours' illness. A young man received a similar dose, and immediately after the injection he became dizzy, nauseated and cyanosed. The pulse rose to over a hundred beats a minute and air hunger was apparent. After one hour's rest he recovered sufficiently to go home to bed. He felt better in five hours. A boy received 2 dg. arsphenamine in 25 c.cm. solution without reaction. Before the next two patients received injections a part of the solution was acidulated with dilute hydrochloric acid until the precipitate reformed. The remaining solution was diluted until 50 c.cm. contained 3 dg. arsphenamine. A middle-aged man received 50 c.cm. of this diluted solution. He became dizzy and was put to bed. He suffered from headache for 12 hours. A young man had received 30 c.cm. of the diluted solution, when he became cyanotic and complained of air hunger. The pulse was rapid. A severe chill, lasting 30 minutes, was experienced. The patient was wrapped in heated blankets. After an hour he recovered sufficiently to go home. He felt nauseated, and suffered from headache for four hours. The author has abandoned the use of arsphenamine.

### (199) Urinary Antiseptics.

E. G. Davis has made an experimental study of the antiseptic qualities and of the renal excretion of compounds related to phenolsulphonephthalein (*Journ. Amer. Med. Association*, March 2, 1918). The ideal urinary disinfectant should be a drug which is of stable chemical constitution, of low toxicity and without irritant action on the urino-genital passages. Such a drug should be germicidal when greatly diluted with urine, and should be eliminated in high concentration by the kidney. Phenolsulphonephthalein possesses many of these attributes. It is stable, non-toxic and non-irritant, and is eliminated with rapidity and completeness by the kidney. It does not possess any antiseptic qualities except in the aqueous solution of its free acid. A dose of 6 mg., given intravenously to man is diluted a million times in the blood stream, yet phenolsulphonephthalein appears in the urine of the bladder in two minutes, and 70% to 80% of the dose of 6 mg. has been excreted in an hour. The author has obtained a series of compounds related in various ways chemically to the sodium monophenolsulphonephthalein. These include metallic sulphonephthaleins, phthaleins and substances of the xanthone class, in which an oxygen atom links the two phenol groups. Such bodies are phthalein but not sulphonephthalein, and substances of the xanthone group which have been brominated. In testing the germicidal qualities of such substances, the author notes that dilution with urine frequently diminishes the antiseptic power observed with aqueous solutions. He considers further that the antiseptic qualities of the urine, excreted after administration, should be measured. The salts of phenolsulphonephthalein with the heavy metals give no promise of value as urinary antiseptics, but the sulphonephthaleins conjugated with thymol, salicyl, cresol, etc., are secreted with great rapidity, as they have little germicidal power when diluted with urine. The substitution of halogens into the sulphonephthaleins prevents the rapid excretion through the kidney. The phthaleins yield no results promising utility as urinary disinfectants. The xanthone derivatives possess the "renal affinity" in a remarkable degree, though bromination interferes with this quality. Some of them are germicidal, and a further study of the group is likely to lead to the discovery of more powerful urinary disinfectants.

### (200) Action of Digitalis on the Cat's Heart.

G. C. Robinson and F. N. Wilson (*Journ. Pharm. and Exper. Therapeutics*, January, 1918) have studied the effects of injections of tincture of digitalis on the cardiac contraction in the cat. The tincture of digitalis, diluted with nine parts of physiological saline solution, has been introduced into the femoral vein and the heart beats recorded by means of electrodes attached to the left hind leg and to the right fore leg, and connected with a string galvanometer. The lethal dose of the tincture of digitalis has been ascertained to be one mil. per kilo. body-weight. The tincture has been given as one tenth of the calculated lethal dose intravenously every ten minutes. The cats have been kept under light anæsthesia and care has been taken to guard against any diminution in the supply of inspired air. Ten experiments have been performed with intact cats and eight with vagotomized cats. A change in the form of the ventricular complex, viz., an inversion of the T wave, is the first sign of the action of digitalis. This appears when 25% of the lethal dose has been given. Prolongation of the conduction time between auricles and ventricles is noticed when 50% of the lethal dose has been administered. Idio-ventricular complexes appear when 70% of the lethal dose has been injected, while dissociation of the auricular and ventricular contraction constantly appears with 80% of the lethal dose. The rate of the heart beat is slowed after 25% of the lethal dose has been injected and the slowing is maximal when 70% of the lethal dose has been given. The further injection of the drug accelerates the auricular and ventricular contractions, but chiefly the latter. After section of the vagi nerves the change in the T wave occurs with the same dosage as in the intact cat, but the auriculo-ventricular conduction and the rate of the heart are unaffected by the injection of digitalis even to the lethal dose. These results show that digitalis acts both directly upon the heart and through the vagus nerve centre.

### (201) Pharmacological Action and Diet.

W. Salant and A. M. Swanson (*Journ. Pharm. and Exper. Therapeutics*, February, 1918) have studied the effect of diet in modifying the nephritis produced in rabbits by the administration of sodium tartrate. The investigation is a continuation of a previous study from which it appeared that the nephritis, induced by the administration of oil of chenopodium, can be prevented by the free use of young carrots. When sodium tartrate is given by the mouth to rabbits fed upon oats, large doses are needed to inhibit the secretion of phenol-sulphone-phthalein. Recovery of renal function is complete in all cases. When, however, small doses of sodium tartrate are given subcutaneously to rabbits fed upon oats, a pronounced inhibition of the excretion of phenol-sulphone-phthalein is observed. The renal function improves in a few days, but complete recovery of function is never noticed. If carrots form the diet of the rabbits, medium doses of sodium tartrate must be given subcutaneously to produce any inhibition of the excretion of phenol-sulphone-phthalein, while, even after large doses, the alteration in renal function is often of a temporary nature. When sodium tartrate is given subcutaneously in gradually increasing doses to rabbits fed upon carrots, no impairment is seen in the renal functions with large doses such as 4 to 6 grammes per kilo. body weight. When oats form the diet permanent injury to the renal function is produced by small doses of the tartrate given in the same way.

## UROLOGY.

### (202) Urinary Extravasation.

John A. Wolfer contends that normal sterile urine only causes a reaction in the tissues in virtue of its mechanical irritation. It is apparently tolerated for some time without producing physical effects, and necrosis only supervenes when normal sterile urine has been extravasated for a considerable period and in relatively large quantities (*Surg., Gynec. and Obstet.*, March, 1918). When the extravasation of normal urine takes place from the bladder or urethra, in the absence of any stenosis, the acute local disturbance and sepsis do not supervene until the necrosis has resulted and destructive ferments are absorbed. This condition is always traumatic. At times a spontaneous cure takes place by the closure of the perforation and the normal egress of urine. If the perforation is intraperitoneal, the peritoneal cavity should be wiped, and closed without drainage, save when distinct peritonitis is present. When the perforation is extraperitoneal, the wound is closed and a gutta percha drain is left in place for 24 hours. A rent in the normal urethra may be closed with fine catgut and a retention catheter left *in situ*, or, if the tear be extensive, a suprapubic cystostomy should be performed. In dealing with extravasation of septic urine, the author points out that the bladder empties itself as a result of a stimulation of its mucous walls, especially in the neighbourhood of the trigone. In the presence of a urethral stricture, perforation behind the stricture would be followed by a constant pressing of the urine into the tissues. He has made the experience that a suprapubic puncture undertaken to relieve complete retention from stricture, if left alone, invariably results in the extravasation of septic urine into the space of Retzius and the ultimate death of the patient. He advises the use of a very fine needle and the institution of drainage of the bladder within a few hours of the puncture. In certain cases the perforation is effected by the passage of an instrument through the stricture and through the urethral wall. The presence of extravasation is frequently missed, because the tip of the examining finger is inserted too high in the rectum. There is fullness and tenderness in the area just internal to the anal sphincter. The treatment for this condition should be suprapubic cystostomy and wide incisions in the infiltrated and œdematous areas. Subsequently, the strictures must be treated in some suitable manner. The author also discusses perforation due to infection in cases of stricture, and deals in some detail with the mechanism of the extravasation arising in these cases. The principle of treatment is the same as in other cases with septic urine.

### (203) Tumours of the Kidney.

F. A. Baldwin objects to Garceau's classification of tumours of the kidney as being too indefinite, and suggests that it would be better to regard renal tumours as arising (1) from connective tissue, (2) from the epithelium, and (3) from embryonic remains (*Urol. and Cutan. Rev.*, April, 1918). The first class includes fibromata, which are rarely large, and are usually found accidentally at operation or at autopsy, lipomata, which are also rare, and angiomata, which, like the two former, have little clinical significance. Of the second-class, carcinomata are not common, but may arise in any part of the organ and may grow to a considerable size. He mentions that he has knowledge of one instance of a true endothelioma of the kidneys. Malignant adenomata are usually small encapsulater tumours. They are malignant by position only and do not produce metastasis, save when they infiltrate the parenchyma of the kidney. In these cases they should probably be classed among the carcinomata. Formerly, primary carcinoma of the kidney was regarded as the most common renal tumour, but it is now recognized that this condition is relatively rare, and that the frequent tumour is a hypernephroma. Fœtal remains of adrenal tissue may be included in one or both kidneys during the course of development. These remains are usually situated in the upper portion of the organ and more frequently in the right than in the left. Well encapsuled, small hypernephromata are commonly found at autopsy. At times, however, these inclusions become malignant and grow to enormous size. These tumours readily undergo necrosis. Two types are recognized, *viz.*, the type representing the cortical substance and that representing the medulla. The latter give rise to metastatic growths more frequently than the former. The third class of tumours also includes the rhabdomyomata. These tumours are regarded as arising from fœtal inclusions of striped muscular tissue in the kidney. Other tissues of the mesonephritic regions may also be the starting point of fœtal inclusion tumours. The last tumours mentioned are the dermoid. They are usually very small.

### (204) Complement Fixation Test of Gonorrhœa.

R. B. H. Gradwohl (*Urol. and Cutan. Rev.*, April, 1918) describes a modification of the Hecht-Weinberg technique of performing the complement fixation test in the diagnosis of gonorrhœa. He was led to work out this method by the recognition of the fact that some of the gonococcal antibodies are thermolabile, while others are thermostable. When the immune serum is heated some of the antibodies are destroyed, and consequently negative results of the test in cases of undoubted gonorrhœal infection are recorded. The author therefore works with unheated serum, and determines the hæmolytic activity of each sample of serum by titrating the amount of natural complement and of natural anti-sheep amboceptor. This amboceptor is present in nearly all normal human serum. He applied the test in 16,000 cases and found that in no less than 4,800 a positive result was obtained by his method, while a negative result was obtained when the original technique of Wassermann was employed. He is convinced that the disappearance of the complement fixation power indicates a serological cure of gonorrhœa. On the other had, it is doubtful whether the reaction can remain positive after a cure has been effected. He quotes some cases to show that freedom from infection can be assured from a negative response to his test. Full details of his technique are appended.

### (205) Albuminuria.

David Riesman (*Journ. Amer. Med. Assoc.*, December 15, 1917) calls attention to a certain class of albuminuria, in which the renal function appears to be but little disturbed, and in which the albuminuria persists for a long time. He cites a number of cases to show that the albuminuria in these cases is dependent on a focal pathological lesion elsewhere. His first case, a boy aged nine, was weakly, had little appetite, and passed little urine, which contained a small amount of albumin and occasional casts. On examination, the tonsils were found to contain caseous pus, and the child also had adenoid vegetation. After the throat condition was treated, the albuminuria cleared up, and the lad became healthy and active. The second patient had a renal calculus. After its removal, the albuminuria, which was of many years' duration, cleared up. In his third case the albuminuria was traced to a tonsil infection, and disappeared after enucleation. He also refers to some cases in which the albuminuria developed in the course of an infective process, such as syphilis, and disappeared on the treatment of the infection. In other cases he discovered that it was due to dental abscesses. He makes special reference to persons who are rejected for life insurance on account of a symptomless albuminuria.

### (206) Ulceration After Prostatectomy.

E. A. Graham (*Surg. Gynec. and Obstet.*, April, 1918) records the case of a man, aged 83, in whom he carried out the two-stage operation of prostatectomy, and in whom necrosis and ulceration of the edges of the wound occurred while the bladder was being drained. After the bladder had been opened for the purpose of preliminary drainage the condition of the urine became much improved, but an exploration revealed a large amount of pus in a sacculation of the bladder. The prostatectomy was undertaken after this sacculation had been drained. Six days later the edges of the wound became necrotic, and several circular ulcers appeared. There was a characteristic glairy mucoid secretion. The intervening skin was erythematous. The condition resisted treatment for some time, but eventually cleared up after the ulcerated areas had been cauterized with silver nitrate. A bacteriological examination of the secretion revealed that the ulceration was due to *bacillus mucosus capsulatis*.

## THE INSANE IN NEW SOUTH WALES.

The Inspector-General of the Insane of New South Wales is to be congratulated on having issued his report for the year 1917 in March of this year. We have received our copy on April 24, 1918. It is, as usual, an admirable record of the activity of an important public department, and in the space of 16 foolscap pages, there is a large fund of information. The publication of short reports is not only advisable from the point of view of economy, but has the additional advantage of attracting readers, which is not shared by voluminous reports.

Dr. Eric Sinclair, the Inspector-General, again protests against the inadequate provision made for persons suffering from mental disease in the State of New South Wales. At the end of the year under review, there were no less than 760 patients in excess of the accommodation. He points out that since those suffering from mental affections of sufficient severity to necessitate certification, are compelled by the State to undergo treatment in the mental hospitals, a reasonable amount of comfort should be given them. The overcrowding in these hospitals, resulting from the steady increase in the number of patients admitted, becomes worse year by year, and yet the urgent demands for extensions to the hospitals are persistently ignored. Building should be started at once, and the utmost expedition should be adopted, in order that the period during which this disgraceful lack of proper accommodation must still exist, may be as short as possible. There is also ample reason for complaint concerning the provision made for the criminal insane. Some years ago the proposal was made that the Industrial School for Girls should be handed over for this purpose. The building is unsuitable for an industrial school, but could be adapted to the requirements of a hospital for insane persons who have been guilty of crime. The Government should erect a more up-to-date building for the industrial school, and liberate the present building for Dr. Sinclair's purposes.

The number of persons admitted to the mental hospitals during the year 1917 was 1,310, while in the years 1914, 1915 and 1916 it was 1,421, 1,346 and 1,426. The number of those in the mental hospitals has increased by 96. The increment to the hospital population had gradually diminished from 184, in 1913, to 138, in 1916. Dr. Sinclair considers that this falling off of the number of persons in the mental hospitals since 1914 is the reverse to what might have been expected. He points out that in England and Wales the war is supposed to have created exceptional conditions, which have resulted in an actual diminution of insanity among the general population. It does not appear at all likely that the war conditions have influenced the frequency of mental disease in Australia. In view of the very complex nature of the ætiological factors, many of which are quite unknown to psychiatrists, it is improbable that the conflicting social and economic changes effected by the war should be distinctly reflected in the general population of Australia. It must be remembered that while the wage-earner in England is in an improved position to-day, the large "middle class" is undoubtedly suffering greatly. The consumption of alcohol is said to have decreased to some extent, but this advantage is probably more than counteracted by the increase in the incidence of venereal disease and by the appalling mental shocks received both by the soldiers serving at the front and by their relatives at home. On the other hand, the conditions in Australia are quite different. Australia scarcely feels the war from an economic point of view. The control of affairs by the industrial section of the community has long since destroyed all conception of the relative value of skilled and unskilled labour. It is doubtful whether the war has produced an increased amount of venereal disease in Australia; it was very wide-spread before. There may be a slight improvement in regard to the abuse of alcoholic beverages; it is certainly not considerable.

The total number of persons certified as insane under official cognizance on the last day of the year was 7,284. Of these 6,795 were in hospitals, 461 on leave, 84 were in licensed houses, and 47 were in the Parkside Mental Hospital in South Australia. The proportion of the insane to the general population is given as 1 in 254. The proportion of persons admitted to the hospitals to the general population was 1 in 1,426. This figure is referred to as "the occurring insanity." It has tended to increase during the past five years, and was 1 in 1,295, in 1916, as compared with 1 in 1,466, in 1912. We have already pointed out elsewhere that the significance of this figure is probably impossible to assess.

During the course of the year 584 persons were discharged from the mental hospitals, with the annotation of "recovered." In addition, 89 persons were discharged after distinct improvement had been registered. The "recovery rate" is expressed as a percentage of the number of persons admitted and re-admitted. It stood at 44.58%, including figures from the Hospital for Imbeciles, and 46.9%, excluding these figures. Dr. Sinclair records an increase of 4.77% in the recovery rate, as compared with the average for the past ten years. It is to be noted that while 584 persons were discharged as recovered during the year, no less than 315 persons were re-admitted to the hospitals.

On the first day of the year there were 453 persons on leave, and during the course of the year 872 were granted leave, making a total of 1,325. Of these, 370 obtained their discharge, 477 returned to hospital, 17 died and 461 were still on leave on the last day of the year. The number of deaths was 534, which yields a death-rate of 7.74% on the average number of patients in the hospitals. The proportion of deaths caused by diseases of the brain was 38.34%. There were 69 due to general paralysis of the insane, 54 to inflammatory and other cerebral lesions, 28 to maniacal and melancholic exhaustion, 21 to apoplexy and paralysis (this is surely not a brain condition, but a pathological affection of the vascular system), and 22 to epilepsy and convulsions. In addition to the 21 deaths caused by cerebral hæmorrhage, there were 90 due to diseases of the heart and blood vessels. Pulmonary tuberculosis and pneumonia accounted for 94 deaths. Four patients committed suicide and five were accidentally killed. Of the deaths by suicides only one occurred among the hospital patients. Other accidents occurred both among the hospital patients and among those on leave. In each case it was ascertained that reasonable care is exercised over the patients, and in those cases in which a member of the staff is found to be culpable, some suitable action is taken to prevent a recurrence.

The Mental Wards at Darlinghurst continue to fulfil an important function. Patients are admitted without certification, and in many instances recovery follows without admission to a hospital for the insane. At the beginning of the year there were 19 patients in the ward, and during the twelve months 132 persons were admitted. Three of these patients died, and 132 were discharged. During the course of the year no less than 1,569 persons were dealt with in the Reception Houses at Darlinghurst and Newcastle. No less than 658 patients were discharged without certification, while the remaining 911 were placed in institutions. At Darlinghurst, 831 were transferred to mental hospitals or licensed houses, and at Newcastle 59 were transferred. Fifteen patients died at Darlinghurst and three at Newcastle.

The total number of patients in the Hospital for the Criminal Insane, at Parramatta, was 37. Of these, 15 were convicted for murder, manslaughter, etc., 11 for offences against property, 6 for sexual offences and 5 for assaults, violence to individuals, etc. There were in the Observation Ward, in the State Penitentiary at Long Bay, at the beginning of the year, 7 persons, including four who had been admitted to the gaol. During the course of the year, 54 further persons were admitted to the ward. Of these, ten were found to be of sound mind, 14 were discharged to mental hospitals, 15 were sent to the Reception House, and 14 were sent to Police Courts. Eight persons were still under observation at the end of the year.

Dr. Sinclair calls attention to the failure on the part of the Government to make adequate provision for the care of inebriate persons other than those who have been found guilty of some offence. Although the *Inebriates Act, 1912*, contemplated action by the Government, no institution was provided until the Inspector-General of Prisons set aside a limited accommodation for inebriates at Shaftesbury. In 1915 the first male patients were admitted, and in the following year, the provision for women was made available. Admission to this institution is voluntary. A much larger and more suitable institution is needed.

The cost of maintenance in the year per patient works out at £48 16s. 9⅞d. This sum is reduced by sundry receipts, including money collected for maintenance, etc., to £38 8s. 8½d. The average cost of stimulants per patient per annum was 6d. The report contains other interesting information, chiefly presented in tabular form. We are, unfortunately, unable to devote space to these additional matters at present.

## Public Health.

### NEW SOUTH WALES.

The following notifications have been received by the Department of Public Health, New South Wales, during the fortnight ending May 25, 1918:—

| | Metropolitan Combined District. | | Hunter River Combined District. | | Rest of State. | | Total. | |
|---|---|---|---|---|---|---|---|---|
| | Cs. | Dths. | Cs. | Dths. | Cs. | Dths. | Cs. | Dths. |
| Enteric Fever | 5 | 0 | 2 | 0 | 16 | 1 | 23 | 1 |
| Scarlatina | 34 | 0 | 1 | 0 | 20 | 0 | 55 | 0 |
| Diphtheria | 117 | 6 | 20 | 1 | 135 | 3 | 272 | 10 |
| *Pul. Tuberculosis | 65 | 23 | 0 | 0 | 6 | 3 | 71 | 26 |
| C'bro-Spl. Menin. | 1 | 0 | 2 | 0 | 0 | 0 | 3 | 0 |
| Poliomyelitis | 0 | 0 | 2 | 0 | 2 | 0 | 4 | 0 |

* Notifiable only in the Metropolitan and Hunter River Districts, and, since October 2, 1916, in the Blue Mountain Shire and Katoomba Municipality.

### VICTORIA.

The following notifications have been received by the Department of Public Health, Victoria, during the fortnight ending May 26, 1918:—

| | Metropolitan. | | Rest of State. | | Total. | |
|---|---|---|---|---|---|---|
| | Cs. | Dths. | Cs. | Dths. | Cs. | Dths. |
| Enteric Fever | 3 | 0 | 6 | 0 | 9 | 0 |
| Scarlatina | 47 | 0 | 60 | 0 | 107 | 0 |
| Diphtheria | 222 | 6 | 215 | 4 | 437 | 10 |
| Pulmonary Tuberculosis | 31 | 19 | 17 | 4 | 48 | 23 |
| C'bro-Spl. Meningitis | 4 | — | 1 | — | 5 | — |
| Poliomyelitis | 3 | — | 8 | — | 11 | — |

### QUEENSLAND.

The following notifications have been received by the Department of Public Health, Queensland, during the fortnight ending May 25, 1918:—

| Disease. | No. of Cases. |
|---|---|
| Enteric Fever | 10 |
| Scarlatina | 17 |
| Diphtheria | 118 |
| Pulmonary Tuberculosis | 17 |
| Cerebro-spinal Meningitis | 5 |
| Poliomyelitis | 1 |
| Erysipelas | 1 |
| Bilharziosis | 1 |

### SOUTH AUSTRALIA.

The following notifications have been received by the Central Board of Health, Adelaide, during the week ending May 18, 1918:—

| | Adelaide. | | Rest of State. | | Totals. | |
|---|---|---|---|---|---|---|
| | Cs. | Dths. | Cs. | Dths. | Cs. | Dths. |
| Enteric Fever | 1 | 0 | 7 | 0 | 8 | 0 |
| Scarlatina | 0 | 0 | 6 | 0 | 6 | 0 |
| Diphtheria | 6 | 1 | 33 | 0 | 39 | 1 |
| Pulmonary Tuberculosis | 2 | 2 | 4 | 2 | 6 | 4 |
| C'bro-Spl. Meningitis | 0 | 2 | 0 | 0 | 0 | 2 |
| Puerperal Fever | 0 | 0 | 0 | 2 | 0 | 2 |
| Erysipelas | 1 | 0 | 7 | 0 | 8 | 0 |
| Pertussis | 0 | 0 | 4 | 0 | 4 | 0 |

### WESTERN AUSTRALIA.

The following notifications have been received by the Department of Public Health, Western Australia, during the three weeks ending May 18, 1918:—

| | Metropolitan. Cases. | Rest of State. Cases. | Totals. Cases. |
|---|---|---|---|
| Enteric Fever | 8 | 5 | 13 |
| Scarlatina | 50 | 8 | 58 |
| Diphtheria | 66 | 43 | 109 |
| Pulmonary Tuberculosis | 15 | 2 | 17 |
| Malaria | 1 | 0 | 1 |
| Puerperal Fever | 1 | 0 | 1 |
| Septicæmia | 0 | 1 | 1 |
| Pyæmia | 1 | 0 | 1 |

### TASMANIA.

The following notifications have been received by the Department of Public Health, Tasmania, during the week ending May 18, 1918:—

| Disease. | Hobart. Cases. | Launceston. Cases. | Country. Cases. | Whole State. Cases. |
|---|---|---|---|---|
| Enteric Fever | 2 | 0 | 3 | 5 |
| Scarlatina | 0 | 0 | 1 | 1 |
| Diphtheria | 0 | 7 | 11 | 18 |
| Pul. Tuberculosis | 4 | 1 | 1 | 6 |
| Puerperal Fever | 0 | 1 | 0 | 1 |

### NEW ZEALAND.

The following notifications have been received by the Chief Health Officer, Department of Public Health, Hospitals and Chritable Aid, New Zealand, for the four weeks ending April 29, 1918:—

| Disease. | No. of Cases. |
|---|---|
| Scarlatina | 169 |
| Diphtheria | 564 |
| Enteric Fever | 50 |
| Pulmonary Tuberculosis | 60 |
| Poliomyelitis | 1 |
| Puerperal Fever | 4 |
| Erysipelas | 12 |
| Cerebro-spinal Meningitis | 1 |
| Trachoma | 2 |
| Septicæmia | 1 |
| Hydatids | 4 |
| Ophthalmia Neonatorum | 4 |

The first prosecution of a pharmacist for undertaking the treatment of venereal disease under the Victorian Act was heard at the District Court, Melbourne, on May 28, 1918. A pharmacist, named William Westbury, of 365 Swanson Street, Melbourne, was charged with supplying medicine to a person suffering from venereal disease, although he was not a registered medical practitioner, or a person acting under the direct instructions of a registered medical practitioner. It appears that the defendant delivered a lecture on the subject of venereal disease, on April 14th, 1918, and at the conclusion of the lecture a certain person, who was undergoing treatment for a venereal infection at the Melbourne Hospital, spoke to him. The defendant advised him to call at his shop, and on the following day, when this person acted on his advice, he supplied him with a bottle of medicine and promised to cure him for £6. The defendant was fined £15, and costs, amounting to £6 3s. 6d., were allowed.

## University Intelligence.

### THE UNIVERSITY OF SYDNEY.

A meeting of the Senate of the University of Sydney was held on May 6, 1918, at University Chambers, Phillip Street, Sydney.

Letters were received from the following: (1) His Excellency the Governor of New South Wales, acknowledging the congratulations of the Senate on his accession to office. (2) Mr. E. W. Knox, acknowledging the resolution of the Senate, thanking him for his valuable services. (3) Department of Repatriation, expressing the appreciation of the Minister for the concessions extended to returned soldiers whose courses as students have been interrupted by

military service, and who are in need of financial assistance. (4) Minister for Defence, thanking the University for the services of Assistant Professor Madsen in the Engineering Officers' Training School, and expressing high appreciation of Assistant Professor Madsen's services.

The resignation of Dr. R. M. Allan as Demonstrator in Anatomy was accepted, and it was resolved that a letter be sent appreciative of his action in enlisting. On the recommendation of Professor Wilson, Dr. A. J. Traill was appointed Demonstrator in Anatomy, and Dr. L. G. Teece as Honorary Demonstrator.

A letter was received from the Pharmaceutical Society of New South Wales, notifying a vote of £100 towards the purchase of apparatus, etc., for the teaching of pharmacy students. It was resolved that a letter of thanks be forwarded.

A letter was received from Professor Watt, reporting the donation, by Miss H. Stephens, of books and microscopic slides belonging to her brother, the late Captain Harry Stephens. The donation was accepted with thanks.

A letter was received from the Royal Military College, asking the University to undertake the Entrance Examination and Examination of Cadets. It was resolved that the request be complied with, and it was referred to the Professorial Board to nominate examiners.

The following degrees were conferred *in absentia*:—B.A.: Mainby, Thomas Russell Mackenzie, Carrington, Louis Christopher, Shand, John Wentworth. B.Ec.: Murphy, John Joseph. Ch.M.: Saxby, George Jacob Maxwell. B.Sc.: Thompson, Myrtle Ellen.

The following were appointed to the Walter and Eliza Hall Fellowship:—(1) The Engineering Fellowship: H. J. Vogan, B.E.; (2) Agricultural Fellowship: W. L. Waterhouse, B.Sc. (Agric.).

The following recommendations from the University Extension Board were adopted:—

(1) That Mrs. Frances Anderson and Miss Mabel Tilley be appointed lecturers under the Board.
(2) That the Acting-Director of Tutorial Classes, Mr. G. V. Portus, B.A., be appointed a member of the Board for the remainder of the year, in the place of Mr. Meredith Atkinson.

The following appointments were made on the recommendation of the Joint Committee for Tutorial Classes: (1) Mr. R. A. Thompson, B.A., Miss Leila Thomas, B.A., on the probationary list of tutors; (2) Mr. F. A. Bland, M.A., LL.B., Acting Assistant Director of Tutorial Classes for one year; (3) Mr. G. V. Portus, B.A., as representative of the University on the Workers' Educational Board, in the place of Mr. Meredith Atkinson, resigned.

On the recommendation of the Faculty of Science, it was resolved that the Murray Rainsford Smith Prize be awarded for proficiency in the subject of Materials and Structure, at the third year examination in the Department of Engineering.

The following recommendations, contained in a report from the Professorial Board, were adopted:—

(1) That the regulations for 1917, which applied to students volunteering for active military or naval service be continued for this year.
(2) That the bequest of the late Joseph Miller be treated as an addition to the Organ Fund, and applied in improvements to the organ.
(3) That Science Research Scholarships be awarded to the following: Ethel C. Pinkerton, B.Sc., Vera A. Irwin Smith, B.Sc., Heather H. Sherrie, B.Sc., and Eileen M Broughton, B.Sc.

A report, received from the Faculty of Arts, was adopted.

## Special Correspondence.

(By Our Special Correspondent.)

### LONDON LETTER.

**Pay and Promotion of Medical Practitioners in the Army.**

A report of the Committee on the Promotion of Officers in the Special Reserve, New Armies, and Territorial Force has been issued in the form of a Parliamentary White Paper. It deals with the promotion and pay of officers in the Royal Army Medical Corps, Special Reserve, and Territorial Force, and a note by the Army Council states that the Government have approved of the recommendations of the Committee, with the exception of the first, to the effect that "officers of the Royal Army Medical Corps, Territorial Force, and Special Reserve, who joined before the war, should be put on a level with temporarily commissioned contract officers as regards pay, allowances, and gratuities where they would gain thereby."

The recommendations which have been approved, and are being acted upon, are as follows:—

The regulations regarding increments of pay should remain as at present.

A general list should be introduced for the Territorial Force field ambulance and regimental medical officers.

The promotion of officers belonging to general hospitals and sanitary companies should continue as at present with the following provisos:—

(a) When *à la suite* officers leave the hospitals for other employment, they should be held supernumerary and the consequent promotions should be made.
(b) The introduction of a general list for sanitary companies should be carried out at a later date.

Majors of the Royal Army Medical Corps, Special Reserve, should be linked with majors of the regular Royal Army Medical Corps, and should be eligible for promotion, provided that they are duly recommended when the regular officer next below them is promoted.

The selection of officers for administrative medical positions should continue to be made from the Royal Army Medical Corps as a whole.

Professor R. J. A. Berry will deliver an address on Brain Growth, Education and Social Inefficiency, at the Royal Society of New South Wales, 5 Elizabeth Street, Sydney, on Wednesday, June 12, 1918, at 8 p.m. The President and Council of the Royal Society will be pleased to issue tickets of admission to any member of the British Medical Association desirous of attending the meeting.

## Correspondence.

### THE PUBLIC HEALTH.

Sir,—The article in your issue of May 25, on the above subject, brings again to my mind the truth: "That the knowledge possessed at the present day is not being used to good advantage in preventing ill-health, incapacity and premature death." As one of the old-time practitioners, who knew Sydney when it was expanding into new suburbs, in which the drainage system was constructed on wrong lines, I can say that these suburbs were absolute hot-beds of typhoid fever, and that diphtheria was also frequently in evidence. Old Sydney did not escape, but suffered less severely, possibly through acquired immunity on the part of the inhabitants.

We are now rapidly building up a new Sydney in the confined metropolitan area. This Sydney, to be healthy, must have a properly constructed drainage system. We cannot have that desirable thing, sunlight, in every room, but we can avoid sewer-gas as a part of our daily air-ration. The new Sydney comprises big residential flats and professional chambers of many stories. One of the attractions of these apartments is that they are fitted with wash-basins, with the water laid on tap, and the waste connected with the sewer. You lift the plug, the basin empties itself without the expensive services of a maid. Excellent! and safe if the plumbing is carried out on proper sanitary lines. It is recognized that to prevent a blow back of sewer-gas, or a desiphoning of the water seal, a ventilating pipe should be carried from the summit of the trap to the open air. In many of the new buildings this precaution is neglected. Who is responsible? We would not be allowed to make this mistake in a private residence. If we are to avoid epidemics, or chronic ill-health among the inhabitants of residential flats, some authority must intervene, and insist on sanitary plumbing regardless of expense. I sympathize with the architect, and in a less degree with the landlord, but—*Salus populi suprema lex*—a little ingenuity and a little expense must be incurred and the public health will be secured. Our

Board of Health, with its able President at its head, if endowed with sufficient powers, and advised by up-to-date competent officers, can take this matter in hand and safeguard the public health of Sydney and the State. Parliamentary and municipal legislation, in recent years, by penalizing the man who keeps a bit of open space about his dwelling, a benefit to his neighbour as well as himself, tends to create a city of skyscrapers. Mr. Fitzgerald, Minister for Health, is most keen to do what he can to improve the health of the community. He is proud of the fact that so many city slums have been cleared away. Let us beware that we do not replace these by new slums of a more dangerous sort. The skyscraper slum in modern sanitary science has not directed drainage, lighting and ventilation. Let us use the knowledge possessed at the present day to good advantage in preventing ill-health, incapacity, and premature death.

Yours, etc.,

MEDICUS.

## JONES v. LE COUTEUR.

Sir,—As the conclusions arrived at by me at the hearing of the evidence in this case were that Drs. Frank Andrew, J. Newman Morris, and Wm. M. Clayton had no knowledge whatever of the treatment as carried out by Heath, and that, having no knowledge of the treatment, were in no position to express an opinion upon the work performed by me. And as the correspondence which has appeared in connexion therewith tends strongly to confirm my conviction, I now state, that if Drs. Frank Andrew, J. Newman Morris and W. M. Clayton can bring sufficient testimony to establish the fact that any one of them have at any time carried out this treatment in question, I will be prepared to hand a cheque to one of the Melbourne charities.

Yours, etc.,

RICHARD JONES.

110 Collins Street, Melbourne.
May 27, 1918.

## THE ACTION OF THE BICEPS BRACHII.

Sir,—Dr. W. Colin MacKenzie's conception of the function of the biceps is very interesting, but, I feel, cannot be accepted as stated by him. The supinating action of the biceps deserves emphasis in our teaching, but the statement that "the biceps is not a flexor but only a supinator" would, I think, lead us to wrong conclusions in the application of anatomy to clinical studies. In the investigation into the function of a muscle we have at our disposal a number of methods, including:—

(1) An examination of the attachments of a muscle, from a mechanical point of view, in the articulated skeleton.
(2) An imitation of the force of contraction of the muscle through its tendon, in the dissected subject, and noting the result.
(3) Electrical stimulation.
(4) By observations of the deficiencies in movement following paralysis of certain muscles or groups of muscles.
(5) The study of movement in the normal living subject.

In the case of the biceps the application of these methods would show in (1): A force acting on the radius, as the contraction does, would supinate the forearm, and continuing to act, would flex the forearm on the arm. The appeal to comparative form made by Dr. MacKenzie might with equal justification be made to prove that the biceps is still a flexor, in spite of its new and additional function of supination, since in a large proportion of lower forms the muscle is attached to both bones of the forearm.

In (2) the dissecting room experiment, made by every student of anatomy, invariably results in supination and flexion when the upper limb is held in the ordinary anatomical position.

In (3), if care be taken to limit the effect of electrical stimulation to the biceps, the resulting contraction produces supination and flexion.

In (4) the absence of the biceps does not prevent the individual from flexing the elbow, but the force of the flexing movement is considerably weakened.

(5) In normal individuals the action of the biceps presents a nice problem. Dr. MacKenzie says "that function (flexion) is performed by the more powerful brachialis which alone calls into relaxation the powerful triceps." I agree that the brachialis and its associates in the forearm can relax the triceps, but I would not say the brachialis is the more powerful muscle when compared with the biceps. The brachialis and its associates can produce a powerful flexion of the elbow, but is the biceps really excluded from such a movement? In the prone position, Dr. MacKenzie says, the biceps "must be relaxed and elongated." It is certainly elongated, but its tone is not diminished and must be in a condition to start a movement, or else supination is not possible. It has long been recognized in the realm of sport that elongation of a muscle is the most favourable position for exerting the maximum force, and the adoption of the crouching start by sprinters is really for its efficacy in gaining ground.

Again, if the triceps relaxes during the contraction of the brachialis, what is the muscle doing during the contraction of the biceps? The answer can be demonstrated by watching the triceps during forcible supination when the forearm is extended on the arm. There is a simultaneous contraction of the triceps, and the physiological purpose of that contraction must be to counteract some force tending to flex the elbow, which is the movement antagonistic to that of the triceps. But only supination has been attempted. The most reasonable explanation is that the triceps opposes the flexing action of the biceps, so that a maximum force may be exerted in supination.

The biceps supinates in complete flexion as well as in complete extension of the elbow. The range of movement between the radius and ulna is practically constant, but the relative positions of the origin and the radial insertion are variable. In the living subject, a movement of flexion, commenced with the hand supine and elbow extended, is accompanied by a contraction of the biceps muscle, and this contraction represents force expended. The variable factor in this movement has been flexion of the elbow, in which it is at least reasonable to suppose that force has been used up.

The realm of sport furnishes numerous examples, such as weight lifting and sculling, in which the biceps certainly contracts during flexion of the elbow, which is not accompanied by marked supination. A semi-prone position really represents a position of potential maximum power, since there is no interference with the line of action of the brachialis, the biceps is elongated and the muscles of the forearm attached to the humerus are in a position to assist.

The biceps thus, I believe, takes part in two co-ordinations, the variable factor in the co-ordinations being the contraction of the triceps.

It may be asked why the biceps does not always supinate in preference to flexing, and the answer is that its supinating action is counteracted by the pronating muscles of the forearm when flexion is performed in the prone position and in association with contraction of the flexors of the wrist and hand. The inability of the biceps to supinate in hypertonic conditions of the flexors of the wrist and hand in spastic conditions illustrates this point.

Yours, etc.,

N. W. ROYLE.

Wyoming, Macquarie Street, Sydney,
June 4, 1918.

We have received a statement from the Committee of the Northern Suburbs Medical Association to the effect that the following passages from the obituary notice of the late Dr. Francis:—

> He was placed in a quandary by a movement on the part of some members of the Northern Suburbs Medical Association to prevent him from again settling in his old district. . . . The end came—and a "white man," who had never done anyone a harm and who had earned the affection, respect and admiration of all who knew him, passed out, because others were less noble than he.

have been regarded as a reflection upon the members of the Northern Suburbs Medical Association.

We most emphatically affirm that these sentences have no reference whatever to any action on the part of the

Northern Suburbs Medical Association or of its Committee. We regret that anyone should have misunderstood these sentences by assuming that they referred to the Committee of the Northern Suburbs Medical Association or to the local Association itself.

## Proceedings of the Australian Medical Boards.

### VICTORIA.

The undermentioned has been registered, under the provisions of Part I. of the *Medical Act, 1915*, as a legally qualified medical practitioner:—

William Albert Edward Leary, Federal Coffee Palace, Melbourne, M.B. *et* Ch.B., B.A.O., Dublin, 1893.

## Medical Appointments.

It is announced in *The South Australian Government Gazette* of May 23, that Dr. John Stewart (B.M.A.) has been reappointed an Official Visitor to the Mental Hospital, Parkside, under the provisions of the *Mental Defectives Act, 1913*.

Dr. H. F. Martell has been appointed Deputy Quarantine Officer, Fremantle.

Dr. A. T. Chapple (B.M.A.) has resigned his position as Second Government Medical Officer, Sydney, and Dr. A. E. Gibbes (B.M.A.) has been appointed in his stead.

Dr. F. H. Thornton (B.M.A.) has been appointed a Medical Referee under the *Workers' Compensation Act of 1916* and *The Workers' Compensation Act Amendment Act of 1916*, for the whole of the State of Queensland.

Dr. Frank Andrew has been appointed Honorary Anæsthetist to the Melbourne Hospital.

The appointment of Dr. R. W. Hornabrook as Honorary Surgeon for the Ear and Throat at the Melbourne Hospital is announced.

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xv.

Herberton District Hospital, Surgeon.

Hospital for Sick Children, Brisbane, Two Resident Medical Officers.

## Medical Appointments.

### IMPORTANT NOTICE.

**Medical practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429 Strand, London, W.C.**

| Branch. | APPOINTMENTS. |
|---|---|
| VICTORIA.<br>(Hon. Sec., Medical Society Hall, East Melbourne.) | All Friendly Society Lodges, Institutes, Medical Dispensaries and other contract practice.<br>Australian Prudential Association Proprietary, Limited.<br>National Provident Association.<br>Life Insurance Company of Australia, Limited.<br>Mutual National Provident Club. |
| QUEENSLAND.<br>(Hon. Sec., B.M.A. Building, Adelaide Street, Brisbane.) | Brisbane United Friendly Society Institute.<br>Townsville Friendly Societies' Medical Union. |
| SOUTH AUSTRALIA.<br>(Hon. Sec., 3 North Terrace, Adelaide.) | The F.S. Medical Assoc., Incorp., Adelaide.<br>Contract Practice, Appointments at Renmark. |
| WESTERN AUSTRALIA.<br>(Hon. Sec., Health Department, Perth.) | All Contract Practice Appointments in Western Australia. |
| NEW SOUTH WALES.<br>(Hon. Sec., 30-34 Elizabeth Street, Sydney.) | Australian Natives' Association.<br>Balmain United F.S. Dispensary.<br>Canterbury United F.S. Dispensary.<br>Leichhardt and Petersham Dispensary.<br>M.U. Oddfellows' Med. Inst., Elizabeth Street, Sydney.<br>Marrickville United F.S. Dispensary.<br>N.S.W. Ambulance and Transport Brigade.<br>North Sydney United F.S.<br>People's Prudential Benefit Society.<br>Phœnix Mutual Provident Society.<br>F.S. Lodges at Casino.<br>F.S. Lodges at Lithgow.<br>F.S. Lodges at Parramatta, Auburn and Lidcombe.<br>Newcastle Collieries — Killingworth, Seaham Nos. 1 and 2, West Wallsend. |
| TASMANIA.<br>(Hon. Sec., Macquarie Street, Hobart.) | Medical Officers in all State-aided Hospitals in Tasmania. |
| NEW ZEALAND: WELLINGTON DIVISION.<br>(Hon. Sec., Wellington.) | Friendly Society Lodges, Wellington, N.Z. |

## Diary for the Month.

June 11.—Tas. Branch, B.M.A., Council and Branch.
June 11.—N.S.W. Branch, B.M.A., Ethics Committee.
June 13.—Vic. Branch, B.M.A., Council.
June 14.—N.S.W. Branch, B.M.A., Extraordinary General Meeting, 9 p.m.
June 14.—N.S.W. Branch, B.M.A., Clinical.
June 14.—S. Aust. Branch, B.M.A., Council.
June 18.—N.S.W. Branch, B.M.A., Executive and Finance Committee.
June 19.—W. Aust. Branch, B.M.A.
June 19.—S. Sydney Med. Assoc. (N.S.W.).
June 21.—Q. Branch B.M.A., Council.
June 25.—N.S.W. Branch, B.M.A., Medical Politics Committee; Organization and Science Committee.
June 26.—Vic. Branch, B.M.A., Council.
June 28.—N.S.W. Branch, B.M.A.

### EDITORIAL NOTICES.

Manuscripts forwarded to the office of this Journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to *The Medical Journal of Australia* alone, unless the contrary be stated.

All communications should be addressed to "The Editor," *The Medical Journal of Australia*, B.M.A. Building, 30-34 Elizabeth Street, Sydney, New South Wales.

The Honorary Librarian of the New South Wales Branch of the British Medical Association is anxious to complete the series of the *Lancet* at present in the library of the Branch, Volume I., January to June, 1898, Volumes I. and II., January to December, 1908, and Volume I., January to June, 1909, are needed for this purpose. The Librarian will be grateful if any member who is able to present to the library one or more of these missing volumes, either unbound or bound, will communicate with the Honorary Secretary of the Branch, Dr. R. H. Todd, B.M.A. Building, 30-34 Elizabeth Street, Sydney.